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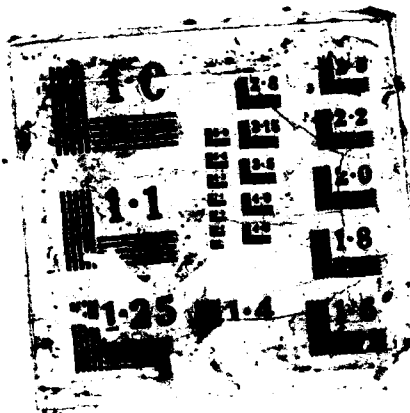
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A CLINICAL INFORMATION SYSTEM
AT THE
NAVAL REGIONAL MEDICAL CENTER
ORLANDO, FLORIDA

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A Problem Solving Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Hospital Administration

By

Lieutenant Albert J. Smith, MSC, USN

April 24, 1981

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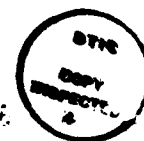
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Per Major Lawrence M. Leahy, Academy of Health Sciences, US Army

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Medicine Clinic, Central Appointment Desk, Outpatient Records Office, and the Data Processing Service. The willingness of these individuals to assist in this project and implementation of this system is greatly appreciated.

Finally, special thanks to my wife, Sue, and children Mike, Kim, and Kenny, whose understanding of the pressures and time constraints added support throughout my residency period.

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PRELUDE

The Department of Defense military medical departments have continually strived throughout their existence to keep pace with or set the pace for the U.S. medical society as a whole. They have constructed modern hospitals and other medical treatment facilities that rival any in the world. They have equipped these facilities with some of the most up-to-date sophisticated technology available. They have developed a multi-hospital system with definite lines of authority, communication, and referral that are far superior to most. Overall, the Department of Defense medical system is a complex, continually growing organization which has the potential to provide a quality of medical care unsurpassed by none. This achievement serves as a source of pride for many past and present managers. However, if a look was taken into the complexity of the system beyond the hierarchy and the bureaucratic levels of control, inside the doors of the expensive

modernistic structures designed to be used as medical treatment facilities; past the individual command executive suites, there at last one would find the grass roots of the whole system: the practitioner/patient encounter. It is this encounter and a series thereof that provides the basis for the organization, and the foundation of the suprasystem. However, it is frequently found that the significance of the individual encounter in the clinic setting takes a backseat to the development of the overall system, its structures, and the sophisticated technology used therein. Many high level managers allow themselves by necessity to become bogged down by overall complexities of the system and frequently lose sight of the actual reasons for their existence within the system. The theme of this paper is "a return to the basics of management for the clinical supervisor."

CHAPTER I
INTRODUCTION

Background

Information is a necessity for good management. Without it management decisions would be purely left to chance, like a throw of the dice. In these austere times, when survival of an enterprise depends on effective management of its resources, it behooves top management to appoint confident and effective managers to man leadership positions throughout their corporations, companies or commands. These managers must possess the knowledge and expertise to act decisively in an ever changing and challenging environment. To effectively accomplish their tasks of doing more with less, successful managers must attempt to reduce the risk associated with their decisions. The risk-reducing process begins with the gathering of information (a fundamental step in effective management). The manager researches and reviews the historical

and current information relative to the subject, then uses it to forecast the possible future and evaluate the possible consequences of the relative decision alternatives. Therefore, it can be said that effectiveness of the decision process depends tremendously on the collection of accurate, timely, factual data that can be transposed into risk-reducing information for the manager.

The Department of the Navy, Bureau of Medicine and Surgery (BUMED) has collected for years general medical statistical information from the various medical centers and activities functioning under their cognizance. This information is used in the preparation of budget estimates, in analysis of personnel authorizations and requirements, in determining the size of replacement or additions to existing facilities, and to evaluate the need for purchasing and locating new forms of technology. The data is collected locally at every command within the Navy Medical Department and compiled by the Naval Medical Data

Services Center, Bethesda, Maryland. The Data Services Center furnishes requested reports to BUMED for their use and provides the data for the publication of a quarterly naval medical statistical report.

The aforementioned statistical reporting system provides useful morbidity information to BUMED and other higher echelons, and gives a picture of the overall productivity of each individual medical facility. However, the usefulness of the data collected is not apparent at the primary input levels of the medical centers. The data is too general to address the informational needs of the clinical supervisor of a multi-practitioner clinic or its staff. Frequently, within the clinic itself, the collecting and reporting of the data is viewed as an externally imposed burden intended for bureau use only. As a consequence, the collection of the data is assigned to junior personnel in high turnover billets (E3-4, Hospital Corpsmen), who lack experience or understanding of the significance

of what they are doing. This results in un-coordinated, nonstandardized reporting systems that are frequently cumbersome and reports of questionable accuracy.

CHAPTER II

STUDY OBJECTIVES

It is the hypothesis of this researcher that the clinical supervisor in a multipractitioner clinic needs objective information to effectively manage his clinic and that this type of information could be provided in combination with that imposed by higher levels of command, without major or costly changes.

Problem Statement

The problem is to develop a clinical information system for the Naval Regional Medical Center, Orlando that will enhance the efficiency and effectiveness of the clinical operation by providing the clinical supervisors meaningful, timely, and accurate information on which to base their management strategies. The problem parameters involve three major aspects of the NRMC outpatient medical care delivery system: appointment scheduling and follow-up, medical staff productivity, and statistical reporting.

The first parameter, that of appointment scheduling and follow-up, involves several elements within the present outpatient medical treatment system. Presently, there appears to be a vast array of patient scheduling techniques being utilized in the medical center. There are some clinics utilizing the central appointment desk, while others prefer to control the patient scheduling from within their own clinic. Then there are the clinics that combine both to perform the function. This lack of conformity leaves one to suspect that there is a possibility that duplication of effort or wasted manhours exist.

The second parameter, that of medical staff productivity, is being researched because in many cases the quantity of patients seen by any given practitioner is questionable. The chief of service may suspect that he has a possible physician burnout problem or willful lack of effort, but he currently has no means to objectively identify the problem. He is left with subjective,

unfounded feelings to base his contentions. Even if he had access to the numbers of patients seen by a given provider within his clinic, he still would not have a means of measuring quality obtained by longer patient/provider exposure times.

The third parameter, that of morbidity reporting, addresses the need to insure that accurate, timely and factual morbidity data is being reported. The concern here is to develop a reporting methodology that highlights errors and insures that all and only legitimate visits are reported for the clinics.

Research Methodology

The following research methods are proposed for this study: (1) direct site analysis; (2) modeling and flow charting; (3) direct and indirect research; (4) recurring data monitoring and analysis; (5) functional analysis; (6) cost-benefits analysis, and (7) literature search, review and analysis.

The direct site analysis will involve examining the existing system as well as the prospective

system. This examination will include, but not be limited to, on-site visits, examination of the system's elements and the cybernetics involved, and methodological investigation of the system's parameters. Modeling and flow charting will occur throughout the project to conceptionally portray the interactions that exist or the manipulations proposed for the real-life systems that are being studied.

Direct and indirect research, including historical research on the existing system, will be integrated with recurring data analysis in an attempt to produce information that will best achieve the objectives of the study. Time analysis of the distinct functional aspects of the elements of the system will be studied and equated to cost for a cost-benefit analysis of the overall system. This is done to evaluate the feasibility of continuing or expanding the project. Finally, an extensive literature search, review, and analysis will be conducted to determine availability of

alternative systems currently in existence, and criteria that may be used for comparison of the outcomes of the proposed system.

Study Outline

The hypothesis of this research is that the development of a clinical information system which provides the clinical supervisor timely, accurate, and factual information will enhance his management abilities and promote the efficiency and effectiveness of the clinical functions.

A. The objectives of this study are:

1. To enhance operational decision making at all clinical levels by compiling objective information for resource planning, policy making, and overall clinical management.
2. To improve quality of patient care.
3. To make simple the procedure and reduce the time required to make a patient appointment.
4. To reduce patient waiting time in the clinic.
5. To reduce the time required to obtain outpatient medical records for daily appointments.

6. To establish a mechanism to maintain accountability for medical records removed from the outpatient medical records office.

7. To reduce the number of cancellations and no-shows for clinical appointments.

8. To improve intra-facility communications.

9. To identify physician workloads, productivity, and time utilization.

10. To be able to more accurately forecast future patient workloads for the individual practitioner and prevent overbooking of returning patients.

11. To insure that accurate factual data is being reported.

12. To establish a cost-benefit comparison between the present and the proposed system.

13. To assess the feasibility of implementing the proposed system in the majority of outpatient clinics after the new NRMCO Orlando replacement facility is opened.

Criteria

Except for a study relative to physician productivity, universal acceptable standards for a clinical information system were not found to be available. If they were available, the uniqueness of the individual characteristics of clinical setting, i.e., number of practitioners, types and differences in populations, demographics, available technology, availability of ancillary services, and many more factors would have to be considered and adjusted to provide a meaningful comparison. Development of such criteria would in itself constitute a research project. Therefore, it has been determined that the most valid criteria to utilize for comparisons is that gathered by past individual clinic practice, and that available after the change has been implemented. Physician productivity will additionally be compared to the outcomes of a University of Southern California study on Internal Medicine Practices.

Limitations

As with many military commands, the Naval Regional Medical Center is forced to operate under austere budget and personnel constraints with little or no excess or flexibility. These constraints and additional time constraints imposed as a consequence of a projected move into a new replacement medical facility, impact directly on this study. First, it has been stipulated that the study will be limited initially to one clinic, that being the Internal Medicine Clinic. Secondly, the test is to run for three months (later to be extended). Third, the expense of conducting the study must be minimal. Finally, the study must be conducted utilizing current staff and equipment.

Assumptions

The following assumptions were inherent to the study's approach, and will provide the basis for the philosophy used in developing the conclusions of this study.

1. That the choice of the Internal Medicine Clinic will provide sufficient informational

requirements to develop a system compatible at least in part to all other specialty clinics of the Naval Regional Medical Center.

2. That comparing the data collected during the study to historical data specific to the clinic will provide a valid basis to determine the feasibility of the proposed system.

3. That the normal workload of the Internal Medicine Clinic will not be inadvertently affected by unusual external circumstances.

4. That manpower and equipment availability will remain consistent throughout the study.

CHAPTER III

THE PROJECT'S ENVIRONMENTAL COMPLEXITY AND INTERRELATIONSHIPS

In order to better comprehend the proposed system and address the stated hypothesis, it is necessary to first understand the environment in which the system must exist. It is the environment that imposes the parameters in which the study must be confined.

The Supra System

According to K. Boulding our system is but a subsystem of another, and that a subsystem of yet another, and this process continues until the realm of it all stretches the limits of man's imagination.¹ Therefore, to limit the universe of the study to realistic proportions it is considered best to recognize the suprasystem as the first overall entity which demonstrates significant controls impacting directly on the study. This suprastructure is the Department of the Navy, Bureau of Medicine and Surgery.

The Bureau of Medicine and Surgery, hence referred to as BUMED, is the seat of the Surgeon General of the Navy, the responsible authority for the operation of the Navy Medical Department. It is BUMED that mandates the general criteria under which each of the 27 Naval Regional Medical Centers and hospitals must operate. BUMED distributes and controls the funds appropriated to the Navy for the operation of the Navy Medical Department. As part of their cybernetics system BUMED requires of the commands under its cognizance, the submission of morbidity data in accordance with their established guidelines and formats. Data generated from this proposed project must interface with and meet the reporting requirements mandated by BUMED. Therefore, the first parameters of the project are those established to meet criteria established by BUMED.

The Parent System

Recognizing that the extent of involvement and ability to impact on the proposed project follows direct lines of authority and responsibility

the next link in the environment most directly associated to the project is the NRMC Orlando, Florida, the command in which the project exists. The NRMC is a general acute care medical facility located in the Central Florida city of Orlando. It houses approximately 104 operational inpatient beds and twenty outpatient clinics. Since this project primarily concerns the operations of the outpatient clinics, the approximate 6,000 yearly admissions to the NRMC is of little relevance. However, the nearly 210,000 outpatient visits to the twenty various specialty clinics represents the population that the proposed system could possibly accommodate in the future. Currently these 210,000 patient visits are accommodated via twenty separate and distinct mechanisms established by the chiefs of each specialty service. Although the basic purpose of these mechanisms are the same (i.e., to arrange for, accomplish, and record the patient encounter), the procedures vary from clinic to clinic and

with each chief of service. These variances imposed the next parameters to the project, that is, to satisfactorily meet the expectations and needs of each chief of service to the maximum extent possible.

The Immediate Environment

As indicated the proposed system is to be developed and tested in one clinic, that being the Internal Medicine Clinic of the NRMC Orlando. The Internal Medicine Clinic's mission is to provide inpatient and outpatient care and regional consultation services to eligible military beneficiaries who require examination, diagnosis and treatment of conditions relative to the specialty. Initial accessibility to the services of the Internal Medicine Clinic practitioners is by consultation only. The Chief of the Service personally reviews every new consult (except emergency consults after hours), and decides which patients can be accommodated by his clinic. His decision is based on his determination of

the availability of the required services, the patient's medical condition, and the capabilities of his medical staff. Patients that cannot be accommodated are advised to seek medical services utilizing the Civilian Health and Medical Program for the Uniformed Services or other available programs.

After the new patients have been accepted to the clinic for care, continuity of treatment is maintained and future accessibility to the clinic for treatment of that condition is arranged without further consult. It is reported that approximately 6,337 outpatient visits (an average of 1,056 per month) were made to this clinic from April through September 1980. Approximately 90% of all these visits were made by returning patients (Appendix A), most of which were comprised of retired personnel or their families. The services of the Internal Medicine Clinic are rendered by a staff of six physicians, two physician's assistants, one Registered Nurse (intermittently), one licensed practical nurse, one secretary, three hospital corps personnel and one to two Red Cross

volunteers. Each practitioner holds scheduled clinics for returning patients, either mornings or afternoons daily; infrequently, they schedule both. The clinic's hours of operation are from 0800-1630 on normal workdays, Monday through Friday, except for Wednesday afternoons, which are reserved for committee meetings. It is in this environment that the project must initially be adapted and this clinical staff which will have input to the finite parameters of the actual test. Success or failure of the project will depend heavily on the acceptability, adaptability and workability within this environment.

Footnotes

¹Asterios G. Kefalas, Ph.d.; Charles G. Schoderbek, Ph.d.; and Peter P. Schoderbek, Ph.d. Management Systems: Conceptual Considerations. (Dallas, Tx: Business Publications, Inc., 1975), p8.

CHAPTER IV

DEVELOPING THE SYSTEM

The Key Factor

As indicated in the prelude to this study if the Navy Medical Department were to be examined to find its sole reason for being, the individual patient/provider encounter would emerge as that basic reason. Therefore, it appears logical that any health information system would use as its key factor the patient/practitioner encounter.

The Preexisting System

In September of 1980 the information system in the Internal Medicine Clinic consisted of a cumbersome appointment system, a follow-up tickler card system, a manually accumulated monthly morbidity report obtained through the use of daily log sheets, and an alphabetical list of patients being followed by the clinic. The information was adequate for the day-to-day operations of the clinic but little more.

Appointments were made from three sources. First, the Chief of Service established appointments for new patients being seen. Secondly, each

individual physician was allowed to personally make calendar appointments for his patients he wanted to see within a short time frame. These appointments are referred to as calendar appointments because the physician would simply write the patient's name on his calendar for a time indicated as non-clinic time; then the clinic secretary would copy the name and time and make the appointment independent of the central appointment desk. The third way appointments were made is through the use of a central appointment desk. The central appointment desk personnel are provided a list of individual clinic days and frequency of scheduling times for each practitioner in the clinic. This schedule then had to be modified by the central appointment desk personnel after a review of monthly physician watch bills to ascertain and preclude scheduling of appointments for a practitioner that was assigned a watch on any given day. The physician on duty for this clinic is to be available for emergencies at all times. As mentioned earlier, the chief of

service and emergency consults are the only way new patients are permitted to access the system; therefore, it should be pointed out that the central appointment desk handles only appointments for returning patients which are identified through the use of a tickler card system.

The tickler card system is initiated in the Internal Medicine Clinic. When a patient checks in for an appointment the clinic's receptionist fills in a patient information card (see Exhibit A) and attaches the card to the patient's record which is sent to the practitioner for the encounter. After seeing the patient the practitioner indicates on the card the month he would like the patient to return. The card then is collected by the receptionist and forwarded daily to the central appointment desk. The personnel at the central appointment desk files the card by month the patient is to return. In the month preceding the month indicated for the patient's return and after determining the available appointments, the central

22-A

EXHIBIT (A) PATIENT INFORMATION CARD

NAME:	
STATUS:	
PHONE:	SSN:
ADDRESS:	
CLINIC:	DOCTOR:
NEW PATIENT:	RETURN PATIENT:
DATE:	
6ND NRM25-6320/32 (1-76)	

EXHIBIT (B) APPOINTMENT SHEET

CLINIC		DAILY MEDICAL APPOINTMENT SCHEDULE			DOCTOR
PATIENT NAME	SOC. SEC. NUMBER	STATUS	YES/ NO	ADDRESS OR PHONE NUMBER	DATE
					0800
					0820
					0830
					0840
					0900
					0910
					0915
					0920
					0930
					0940
					0945
					0950
					1000
					1010
					1015
					1020
					1030
					1040
					1045
					1050
					1100
					1300
					1310
					1315
					1320
					1330
					1340
					1345
					1350
					1400
					1410
					1415
					1420
					1430
					1440
					1445

appointment desk personnel remove the patient information cards from the file and assign them to the available appointments. This is done by transposing the information onto an appointment sheet (see Exhibit B) and the appointment information onto the card. The appointment sheets are then returned to the file and the cards are set aside for further processing. Next the information from the patient information card is transposed onto two separate forms, one being a postcard for notifying the patient of the appointment (see Exhibit C) and the other being a slip to notify the Outpatient Records Office of the day the patient's record is needed in the clinic (see Exhibit D). These slips are accumulated and filed by day until they are sent to the Outpatient Records Office the day prior to the actual appointment. On the morning of the actual appointment the outpatient records and a copy of the appointment sheet were sent to the clinic for preparation for the appointment. When the patient presented for the appointment he was logged in and



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Mr. John Doe
13 Hoplace Street
Nowhere, TX 64286

NAVAL REGIONAL MEDICAL CENTER, ORLANDO, FLORIDA
OUT-PATIENT APPOINTMENT

HAS AN APPOINTMENT AT _____
ON _____ DAY _____ MONTH _____ DATE _____
A. M.
P. M.

☐ DERMATOLOGY ☐ DENTAL ☐ PEDIATRICS
☐ IMMUNIZATION ☐ PHYSIO ☐ SURGICAL
☐ ORTHOPEDIC ☐ EENT ☐ MEDICAL
☐ OBSTETRICS ☐ GYNCOLOGY ☐ UROLOGY

IF YOU ARE UNABLE TO KEEP THIS APPOINTMENT CALL
_____ ONE DAY IN ADVANCE.

6ND NRMCM25-6230/7 (REV. 8-75)

EXHIBIT (C) APPOINTMENT POSTCARD

PATIENT DATA												CATEGORY:		RET USN DEP		RET USMC DEP		RET USA DEP		RET USAF DEP		RET USCG DEP		RET C&G DEP		DEC _____ DEP		CIVILERS		BEC		OTHER:	
USN DEP USMC DEP USA DEP USAF DEP USCG DEP PHS DEP C&G DEP FOREIGN DEP VAR																																	
CARDIOLOGY DERMATOLOGY ENT GEN PRAC FAM PRAC												GYN EYE MEDICAL NEUROLOGY		ORTHOPEDIC NP OB-NEW OB-RETURN		PEDIATRIC SURG-GEN SURG-NEURO SURG-PLASTIC		UROLOGY WALK-IN OTHER:															
C L I N I C																																	
D MON TUE WED THU FRI SAT SUN JAN FEB MAR A 1 2 3 4 5 6 7 8 9 10 APR MAY JUN T 11 12 13 14 15 16 17 18 19 20 JUL AUG SEP E 21 22 23 24 25 26 27 28 29 30/31 OCT NOV DEC												H 8 1 5 00 O 9 2 6 45 75 U 10 3 7 30 R 11 4 AM PM																					
IF YOU ARE UNABLE TO KEEP THIS APPOINTMENT, PLEASE CALL _____												PATIENT'S HOME PHONE _____		DOCTOR _____																			

EXHIBIT (D) APPOINTMENT SLIP

another patient information card completed. Thus, the cycle begins again.

The log sheets used for checking the patient in are the only report, outside of the documentation in the clinical record, that shows the patient had appeared for a visit. From these log sheets the monthly morbidity report is accumulated. No other use of this data was detected.

The final segment of the preexisting information system was a manually prepared, alphabetically maintained listing of patients that are followed routinely by the clinic. This information is transposed from the patient information card onto a rolodex card and filed on the rolodex. This information was maintained for use by the clinical staff if they needed to contact a patient.

As can be seen by review of the previous section (as displayed in Appendix B) the former informational system rightfully focused on the patient/practitioner encounter and brought in

entities outside the structure confines of the clinic itself. It was a working system and had been functioning several years; however, a closer look revealed cumbersome technics, duplication of effort, lack of patient considerations, and an overall failure to fulfill the informational needs of the clinical staff in a timely, accurate manner.

The preexisting system was cumbersome in that many different forms had to be filled out and numerous steps had to be taken to complete the patient encounter cycle. Time studies of this process reveal that it took approximately

Seconds	to	Complete Task
50		Fill out the patient information card.
20		Log the patient in.
37		Transpose patient information to appointment schedule and card.
54		Complete new appointment card.
20		Fill out appointment slip for Medical Records Office.
6		File the card.

These times are of the actual tasks performed without interruption. However, it was found that due to the nature of the operations both in the clinic and at the central appointment desk, frequent interruptions occurred which prolonged the time it took to complete the tasks. The time involved may seem minimal; however, it becomes a burdensome factor when the frequency of occurrence is considered and the clinical setting is looked at closer. In the clinical setting there is only one receptionist that is tasked with greeting the approximate 1,100 patients per month and accomplishing the pre-visit tasks. She sees the patients at a single pass window, which provides a sound surface for writing. Because of the random arrival of the patients within 1-20 minutes of their scheduled appointments, and the capability of the clinic medical personnel to accommodate more than 24 patients an hour, it is not unusual for several patients to be lined up at the single window waiting to be checked in.

While it is less a queing problem in the

central appointment desk due to the absence of the patient standing over the personnel, the preexisting appointment process was still cumbersome and frequently resulted in duplication of effort. The information received from the clinic on the patient information card was, except for the new appointment information, the same used for the appointment postcard sent to the patient, the appointment slip that was sent to the medical records office, and the actual appointment schedule. Thus, this information was repeated three times with minimal information being added to accomplish making a return appointment for a patient.

The return visit itself is another area of contention. As mentioned earlier, the patients are informed, upon completion of their initial treatment (or subsequent encounters), of the month they are to return for a medical follow-up visit. From the time of their last visit the patients do not have any further communication from the clinic until they receive an appointment card from the

central appointment desk. There is no indication of consideration for the convenience of the patients and the potential impact on their personal schedules. This practice, for the sake of simplicity, will be referred to as "blind appointments." As a consequence of making "blind appointments" the central appointment desk experienced as much as 20-25% of the patients calling in for cancellations or requests for re-scheduling. Additionally, without patient contact there was no indication that the patients even received the appointment card. If they did not the result was what is commonly termed a "no show," which means the available practitioner's time was wasted. In an area such as Central Florida with its high percentage of retired personnel, it is not uncommon for them to spend the winters in Florida and their summers in the northern United States, therefore promoting the problem of "no shows."

To make matters worse, under the old appointment system, if the patient was labeled as a "no

show" their patient information card was marked "DNKA" (did not keep appointment), then placed in with the patient information cards marked for the next month's appointment schedule. This practice compounded the problem with the increased chance of another "no show."

Aside from the lack of patient input into the preexisting system, it was also evident none of the clinic personnel had a ready working knowledge of how many patients were told to come back to see a particular practitioner during any projected month in advance. The patient information cards were allowed to accumulate without the practitioner knowing how many patients he had already told to return. Consequently, the prospective patients may have been over or underbooked in any given time frame. Either way, the practice directly affected the utilization of the clinic.

The final area of contention is the information available to the Chief of Service. Shortly prior to the start of this project, the Internal Medicine Clinic had a change of department heads.

The former was transferred out of the area and the present one recently arrived from a Maryland duty assignment. Although he was a new Chief of Service, he was not without experience for he had previously headed a smaller Internal Medicine Clinic at his former duty station. By the time this researcher arrived on the scene he already had a good idea about the functions and operations of his clinic. However, he was somewhat lost about the individual case loads of the assigned practitioners. He suspected a variance in the productivity levels of some of the assigned staff, but was not able, via the preexisting system, to objectively document any problem. The only thing he had to work with were skeptical data from the overall morbidity reports, and his own intuitive imagination.

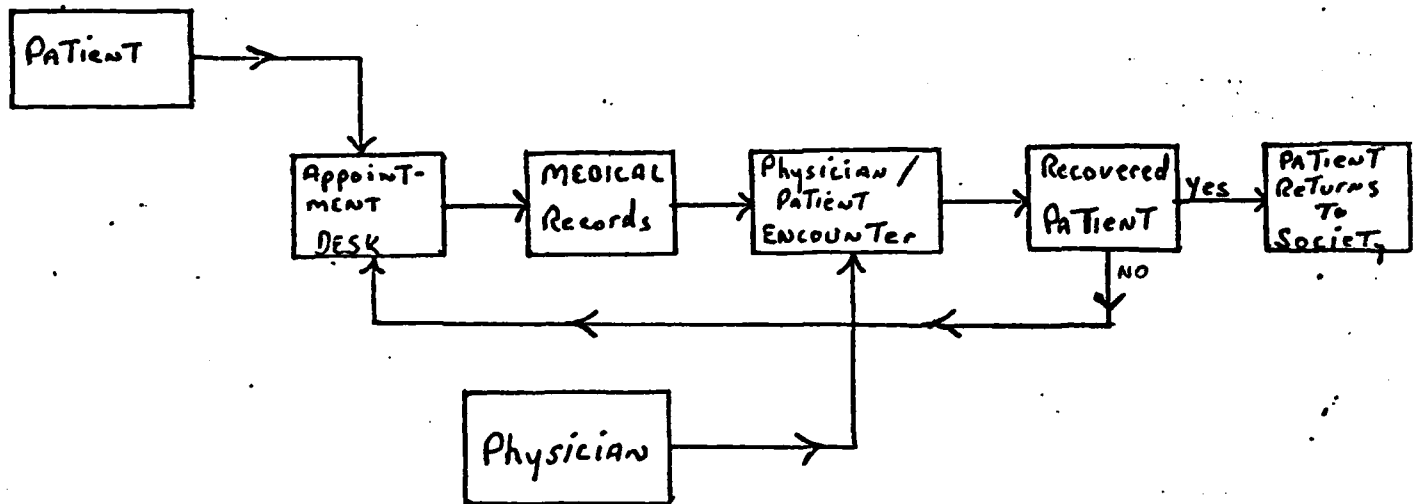
CHAPTER V

THE PROPOSED SYSTEM

After the problems with the current system were recognized, a quest for resolutions was initiated. This quest was restricted by limitations of money, staff, time, and available equipment. Due to these limiting factors, the alternatives for resolving the problems were basically reduced to the use of in-house resources. This presented a somewhat frustrating situation, for it is readily apparent that computer technology currently exists that can rectify these problems rather quickly. However, all was not lost for it was found that the medical center has a Data Processing Service.

An inspection of the Data Processing Service revealed that it was poorly equipped with an outdated IBM 1401 computer and associated EAM equipment, but what the department lacked in hardware the assigned personnel made up for in cooperation and hard work. The Chief of Service

FIGURE 1



THE AMBULATORY MEDICAL CARE DELIVERY SYSTEM

indicated that his staff could handle a minimal increase in workload. This capability provided a mechanism to proceed in the development and implementation of a system to enhance the overall operation and management of the clinic.

The system is designed to be more than a retrospective patient counting evolution. It is intended to be a prospective system that keys in on every element of the ambulatory medical care delivery system (Figure 1), with a specific focus on the patient/practitioner encounter. It brings together at a specific time the four essential elements for a patient/provider encounter: the patient, the medical care provider, the medical record, and the treatment site. It accomplishes this through its elements including the Internal Medicine Clinic, the Central Appointment Desk, the Outpatient Medical Records Office and the Data Processing Service. These elements function together as a system as follows, and as illustrated by Exhibit E.

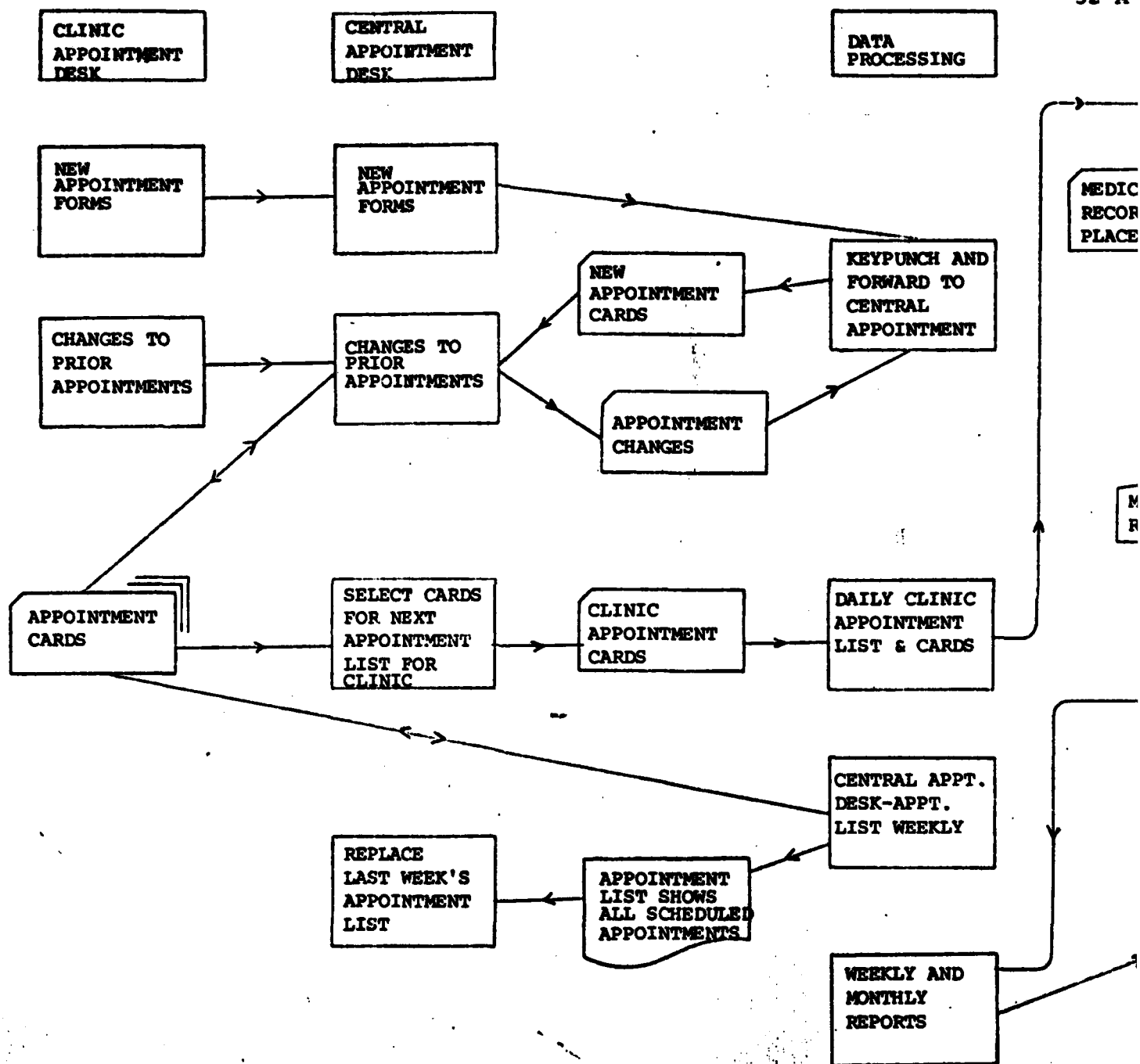


EXHIBIT (E) FLOW CHART FOR PROPOSED SY

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T
C
F.



All appointments for the new system are still made either by the Central Appointment Desk or by the clinic. The difference is that after the appointment is made on the appointment sheet, this data is sent to the Data Processing Service for key punching into computer cards. Then Data Processing Service manipulates these cards in the computer system and produces three initial printouts for the new information system. The first is a list of projected appointments for the next two weeks. The list indicates the patients and their projected arrival dates and times under the name of the practitioner they are scheduled to see. This list allows the individual physician knowledge of who is scheduled in the immediate future, so that he can plan for the patient's treatment or special needs accordingly.

The second printout is a daily list of patients having appointments for the next workday. This is produced in numerical sequence by the patients

social security numbers (see Exhibit F). Copies of this list is sent to the Outpatient Medical Records Office with a duplicate top printed computer card arranged in the same numerical sequence. The printed top of the card identifies the patient and the appointment data. The Medical Records Office personnel use this list and computer cards to pull in consecutive order the medical records for the next day's patient/provider encounters. The duplicated computer card with its patient data serves as a locator card for control and accounting of the medical records.

The third computer printout (Exhibit G) and a group of cards are used for the daily appointment schedule. They identify the patients and their eligibility status delineates the time of scheduled arrival, and indicates the physician the patients are scheduled to see. The list starts each physician's appointments on a separate page and is printed in duplicate. This provides the clinic's receptionist and the individual practitioner each a copy of the information. The

List of records to be pulled for Internal Medicine Clinic Appointments on

SSN	Name	Phone #	Status	Mo	Day	Yr	Time	Phy
2213	Dally, J B	855-0097	DS/N/Ret	10	31	80	0930	07
2345	Smith, H G	791-2476	A/Act	10	31	80	1140	08
4254	Dally, P J	855-3421	DW/AF/Ret	10	31	80	1300	01

5454

5455

6562

6762

1366

1168

9771

5473

07A INTERNAL MEDICINE

APPOINTMENT SCHEDULE FOR 01 APR

PHYSICIAN 002 HOUSE W L

PREPARED 30 MARCH 1981

TIME	NAME	PHONE	PATIENT STATUS	SSN
0900	LYNCH ROBERT	277-5380	/A /RET	9856
0920	KINSEL JOSEPH	277-0668	/N /RET	6530
0940	MCGRATH LORRAINE	671-6032	DW/A /RET	6038
1000	STABILE FRANK	831-9856	/AF /RET	5842
1020	DILLS FLOYD J	862-6401	/N /RET	3292
1040	TICKLE AULETHA	894-8617	DW/AF /RET	1178
1100	GEMINIANI MARY	324-3330	DW/A /DEC	6348
1120	SEIPLE MARY	855-3538	DW/AF /RET	7809
1140	NIERLING CHARLES	-4466	/N /AD	0100

EXHIBIT (C) DAILY APPOINTMENT SCHEDULE

receptionist uses the printed schedule in lieu of a manually kept log. She simply checks the name on the sheet when the patients arrive for their visits. This sheet then becomes a printed historical source of patient identification by date of visit for audit purposes as required by BUMED. Additionally, it can be used as a means to contact the patient if necessary, since the patient's phone number is listed also. The computer cards (see Exhibit H) that accompany the appointment schedules are used to collect additional data such as type of appointment, patient/practitioner contact time, and projected return date, by the clinical support staff and practitioners. These cards are returned daily to Data Processing Service for further key punching and production of the following reports:

1. Tentative Appointment Schedule
 - a. By month for all practitioners
 - b. By month for the individual practitioner

SSN Name Phone Pt. Status Mo Day Yr Time

Phy Code

APPOINTMENT:

1. ADVANCE
2. WALK-IN
3. TELEPHONE
4. Calender

PATIENT TYPE:

1. OUTPATIENT
2. INPATIENT

ACTUAL TIME SPENT WITH PATIENT _____

For Active Duty Navy & Marine Corps Patients:

1. New Case
2. Return Visit Dx. _____

Reschedule for: _____ A B C

EXHIBIT (H) CLINIC COMPUTER CARD

2. Patient Enrollment Report
3. Monthly Clinic Morbidity Report
4. Clinical Performance Report

The tentative appointment schedule compiles the information in two separate ways. First, it provides a list of all return appointments for each month up to 12 months in advance. Each month's appointments are listed first by month and then by the individual practitioner. This list gives the Chief of Service a better idea of actual monthly workload. If a subordinate practitioner requests leave, TAD, or early release, the Chief of Service can look at the report and have some objective indication of the individual practitioner's workload. This information should enhance the Chief of Service's decisions and assist in making changes as necessary to accommodate staff shortages. The other version of this report basically gives the same information but is separated by each practitioner. It informs the provider how many patients he has already told

to come back for any given period of time. The time periods are broken down by month and each ten-day period in the month. Knowledge of this information will assist in preventing over or under-booking of patients, thereby enhancing the efficiency of the clinic's operations and reducing the anguish of frustrated patients forced to endure prolonged waits due to improper scheduling.

The patient enrollment report (Appendix C) is an alphabetical listing of patients that have been seen by an Internal Medicine practitioner and told to return. It identifies the patient both by name and last four digits of his social security number, and lists the patient's telephone number, last appointment, attending physician, eligibility status, and month told to return. The month is further broken down into three ten-day periods: "A" for the first ten days; "B" for the middle ten days, and "C" for the last ten days. The report has multiple uses, but there are two primary uses. First, it is used to replace the manual rolodex

file that was used to identify patients currently being followed by the clinic. The list provides information necessary to reach a patient if necessary, or to request a patient's outpatient record, if necessary. Unlike the rolodex file, the patient enrollment list is updated monthly and purged so that only patients scheduled for future appointments are listed. The second major use of this report is by the Central Appointment Desk personnel. Once the system has been in effect for a period of time (approximately six months), the data base of returning patients should be sufficient for them to discontinue dependence on patient information cards to make appointments. That is, it is proposed that if a card system be used, let it be a system whereby the patients are sent an appointment reminder card approximately one month prior to the time they have been told to return. This card **should** instruct them to call a designated number at the Central Appointment Desk to make an appointment for their return visit. When a patient calls

the Central Appointment Desk, personnel verify on the patient enrollment list the time frame when the patient was told to return. If the patient's name appears on the list for the designated time frame, an appointment is scheduled into an available appointment time slot most suitable to the patient subject to availability. This system actively involves the patient in making his own arrangements, will eliminate "blind appointments", and should reduce drastically the number of appointment cancellations and "no shows" experienced by the clinic.

The third retrospective report is the monthly morbidity report. This report is a numerical summary of patient visits accomplished within the clinic the previous month. It is broken down by categories of eligibility status, (i.e., active duty, retired, dependent, Army, Navy, Marine Corps, Air Force) in accordance with Department of the Navy, Bureau of Medicine and Surgery Instruction. This report is automatically done by the Data

Processing Service by the 5th day of every month. The only thing the clinic has to do is ensure that the completed computer cards for the subject month are forwarded to Data Services no later than the second working day of the next month. By accomplishing the morbidity report in this manner, accuracy and timeliness of submission is insured.

The last report is the clinical performance report (see Appendix F). This report is specifically designed to be a tool for the Chief of Service and the individual practitioner being reported on. It identifies the patient by name and last four digits of his social security number. It then further provides the patient's telephone number, status, appointment type (i.e., prescheduled, walk-in, telephone or calendar), date of last appointment, the attending physician, and date the patient is scheduled to return. Additionally, it gives the amount of time allotted to the patients for their appointments and the actual time the practitioner spends with the patient. At the end of each

individual practitioner's section is a summary of their individual productivity. The summary gives information on the total number of patients seen by that practitioner, total time scheduled (allowed for advance appointments, actual patient/provider contact time), number of patients not keeping appointments, and the amount of time lost because of patients not keeping their appointments. This summary information is repeated at the end of the total report for the convenient use by the Chief of Service. The frequency of this report will vary according to the desires of the Chief of Service. During this study the report was printed both weekly and monthly. A more complete coverage of the use of this report will be discussed later in this paper.

Through the use of the aforementioned procedures and subsequent reports, it is believed that the overall management and efficiency of the Internal Medicine Clinic will improve.

CHAPTER VI

IMPLEMENTATION

A Means of Data Collection

Data processing plays an important role in this system. It is because of the computer's increased capability to manipulate and process rapidly large quantities of data that this system is made possible. A look at Exhibit E highlights that it is primarily the computer card that provides the means to link the system. The computer card is also the basis of information for every report that is generated from the system. Therefore, it should be evident that a major step toward implementation of this system was development of the computer card and the computer programs it feeds.

The development of the computer card is not a one point in time event. Because of its limitations, it must be kept in mind during the entire planning process of the system.

The informational needs of a project, when limited to use of a card-fed computer system, are restricted to only that data that can be provided on the actual computer card itself. The limits of the cards for NRMC computer system are eighty characters. How to best utilize the eighty characters was a real challenge for there tended to be a need for more information. The final decision was contingent on what was really necessary to make it work. With knowledge of the informational needs, reports, and processes of the previous chapter in mind, the logic for the data keypunched into the card should be somewhat evident.

First, there is a need to properly identify the patient for the appointment, records search, and historical reference. This need was resolved with: (1) the patient's last name, first name, and middle initial (if it could fit into twenty-three columns); (2) the last four digits of the patient's social security number (the entire number was

desired, but with the patient's name provided, the last four digits are adequate); and (3) the patient's eligibility status (branch of service affiliation, active or retired, and dependency, if applicable). The patient's eligibility status was also a re-reporting morbidity requirement of BUMED.

Next there was a need to identify when the patient is or was seen (the appointment information). This was easily resolved by providing the month, day, year and time of the appointment. The three letter abbreviation of the month was used instead of the numerical codes to avoid any confusion with the day. The year is used because a few patients are told to return during the same month a year later. Additional appointment information included: the identity of the physician (a two letter code); the appointment type (#1 for an appointment made in advance, #2 for an unscheduled walk-in visit, #3 for a telephone consultation, and #4 for a calendar appointment); the patient type (#1 for an outpatient visit, and #2 for an inpatient clinic

visit); and the amount of time initially allotted for the patient encounter (measured in minutes).

After-the-fact patient data provided by the card included the actual time consumed by the patient/provider encounter (again measured in minutes); a three letter disease or illness code to identify the reason for the active duty member's visit; and the month the patient is to return (a three letter abbreviation). In addition to identifying the month of return, the physician can specify a ten-day period during the month he would like the patient to return and specify whether the appointment should be in the morning or afternoon. The ten-day period is designated by circling an A, B, or C. The A is for the first ten days of the month. The B is for the eleventh through the twentieth days of the month. The C is for the twenty-first day to the last day of the month. To indicate morning or afternoon appointments the physician writes in A.M. or P.M. on the card.

The only other data provided by the card are the patient's telephone number and the clinic's identification. The patient's telephone number provides a means to reach the patient, if necessary. The clinic staff desired the patient's address, but space was not available on the card. The code for the clinic remains the same for the project, but will change if the system is expanded to another clinic at a later date.

Priming the System

After development of the means to collect the data the next step was to put it to work. To do this, all the people concerned had to be informed. Even though they were instrumental to the development from the beginning, they did not really have a knowledge of the entire system. A meeting was held with the participants with the intent to communicate the entire system to them and to get their feedback. To further support understanding, Appendix G was also provided to give them some explicit instructions on what to do.

After the players acknowledged their roles, the system was ready to be implemented.

A target date for change over in the clinic was set for 1 November 1980. Since the input for the November data actually had to come from the appointments made in October, the Central Appointment Desk had to implement the system earlier. All appointments made for the Internal Medicine Clinic for the month of November had to be made utilizing the new procedures.

Initially, the data base was not available in the system to identify the returning patients and there was a desire to run a dual system during the test; therefore, the former patient identification cards still had to be utilized to provide the information to reschedule the patient. However, the problem of duplication of effort could be addressed. Instead of having the clinic complete the patient information card and then having the Central Appointment Desk transpose the information to the appointment card, this

researcher had the clinic personnel initiate the appointment card instead of the patient information card. This process eliminated the need for the patient information cards altogether. The clinic personnel initially filled out the card (having the patient write in their own address), then sent it to the Central Appointment Desk for filing until the actual appointment date and time could be provided and the card mailed to the patient. This step eliminated approximately 83 seconds from the time it took to make each appointment at the Central Appointment Desk. This doesn't appear to be much of a savings, but over the span of a month at a rate of approximately 1100 Internal Medicine appointments per month, this time savings equates to better than twenty-five hours. This time could be better spent providing a service for other clinics. So the process was instituted along with the use of the computer cards.

Resistance to Change

Just when everything looked good, Murphy's Law #1, "If something can go wrong it will," took effect. The personnel at the Central Appointment Desk objected strongly to sending the patient the appointment card and not having a card to keep for their records. Upon investigation of the resistance it was found that the Central Appointment Desk personnel had, in the past, kept the old patient information cards, filed by month, and used them to pinpoint blame when a dispute came up about a mistake in scheduling.

The resistance was strong and came to a point where the entire project could have been placed in jeopardy. Theory "X" action could have been used, but it was felt that the cooperation of the personnel would have been affected. It was felt that if the personnel could be made to see the error in their logic the change could be made. Therefore, a compromise was made. The Central Appointment Desk personnel were told that

in the event of a mistake in scheduling and a patient shows up at the wrong time, the correct action is to resolve the situation by having the patient seen, not to find who's at fault. They were informed that the Chief of Internal Medicine and his staff would work closely with them to resolve the problem in the best interest of the patient if it should occur. However, they would be allowed to continue to keep the patient information cards as a back-up until the system had an ample **data** base to run independent of them or until such time they were convinced the change would benefit them. In less than two months, they requested this researcher to allow them to make the change.

It is personally felt that this resistance had roots deeper than the reasons brought forth. It is possible that the Central Appointment Desk personnel saw the presence of this researcher as a threat to their autonomy or the computerization as a potential threat to their jobs, especially

since it reduced their workloads. Regardless of the true reasons for their resistance, time, knowledge, and confidence in the system resolved their opposition, especially when they learned that their services to the clinic could be expanded with little more effort. That is, the time savings they experienced could be utilized in extending their services to other clinics not presently using them. This means an expanded, more important role for them and job security.

CHAPTER VII

THE FUNCTIONING SYSTEM

Since November 1, 1980 the clinical information system has been functioning successfully. The participants in the system's elements were quick to learn that the information received from the computer was only as good as the data they put in, and that mistakes were readily noticed. As a result of the knowledge that if they let the mistakes exist it would directly affect them, the automated system functions with a minimal amount of errors. An additional feature favored by the participants is the flexibility of the system. Their feedback of ideas and modifications could be, and frequently were, implemented to more closely accommodate their needs.

Originally, it was anticipated that the rough copy of appointments made by the Central Appointment Desk would be sent to Data Processing Service at the close of normal business one day in advance of the actual appointment for keypunching and production of the lists. However, it was found that

appointments were usually made two to three weeks in advance. One of the participants suggested that the lists be sent over earlier and keypunching be worked in at slack data processing time periods. This modification was made and the actual computer cards are sent back to the Central Appointment Desk in sequence according to the date and time of the appointment with the practitioner. This allows the Central Appointment Desk personnel to make changes or cancellations directly to the computer cards; then on the day prior to the actual appointment the computer cards are sent back to data processing for minor modifications and production of the lists. The appointment schedules and other initial lists have been produced and made available to the concerned elements on the morning of every workday.

The only problems that had occurred with the appointment lists were last minute cancellations. These problems were immediately addressed by providing direction (see Appendix H) to the individuals at both the clinic and Central Appointment Desk

concerning who should handle the cancellations and when.

The retrospective reports provided by the system were delayed in processing until December of 1980 due to the lack of computer software developing times. However, from December 1, 1980 on, the lists were produced and made available to the concerned parties in a timely fashion. Changes to these lists were also allowed. Telephone area codes were added to the basic information; a summary recap of the individual physician's performance was added to the clinical performance report, and the same report was produced weekly vice monthly. It is felt that such flexibility to meet the needs of the users must be available if the system is going to work for them; otherwise, the role switches and the players work for the system.

Direct Costs of Operation

The overall worth of a clinical information system such as this by far exceeds the monetary expenses incurred; however, to provide an understandable base of comparison for a cost-benefit-

analysis the actual data processing expenses have been determined to be approximately \$446 per month. This cost includes both manpower and equipment costs. Of this \$446 approximately \$368 is for key-punching and verifying the input data. If a more sophisticated computer system with CRT's and real time were made available to various clinical areas in the future, the input could be accomplished by clinical receptionists or Central Appointment Desk personnel, thereby eliminating the need for key-punching and verifying personnel in the Data Processing Service for this system.

The aforementioned costs are based on a percentage of total time used to run the clinical information system program multiplied by the total operating expenses of the Data Processing Service. However, in reality the development and production of the clinical information system did not increase the expenses of the Data Processing Service, except for a minimal amount of supplies. There were no new personnel hired.

CHAPTER VIII

STUDY RESULTS

The results of this study will be discussed in relation to the various uses of the reports generated by the system to the acceptance and effectiveness of the reports within the various elements. This also will include in the relation text a discussion of cost effectiveness and efficiency gained by utilizing the system. Finally, overall physician productivity for the clinic involved will be discussed in comparison to itself and studies of other Internal Medicine practices.

In view of the combinations of reports provided from a relatively simple inexpensive base of information, an actual cost comparison or cost-benefit analysis may not be readily available for each individual report. The benefits of some reports may be better measured in increased quality, which could ultimately equate to better utilization and lower costs in the long run. To accommodate the system the programs were run during the normal

workday. The Data Processing Service incurred the same personnel and equipment costs as if no new programs had been developed. The only expenses may be equated to benefits foregone or opportunity costs of operating this system instead of another.

Tentative Appointment Schedules

The use of the projected tentative work schedules have, during the course of the study, added a management tool both to the individual practitioner and the clinical supervisor. Evidence of these results, due to the small number of practitioners, was not gathered by a formal survey, but rather by informal means of random communication and personal discussion with providers. Their individual and advance knowledge of who has an appointment within the next two weeks has allowed them to better prepare themselves mentally and the clinic environment physically for the arrival of the patient. The long range projected schedules have aided the Chief of Service in knowing what is projected for each of his physicians and physician's assistants. He

is able to measure projected workloads and adjust the clinical schedule accordingly, thereby accommodating more new patients. He was also able to arrange a predetermined schedule for a reserve medical officer serving on two weeks active duty in the Internal Medicine Clinic. Through the use of these reports, there has been provided a mechanism for better utilization of the physicians' time, more access to appointments for the patients, and better management by the Chief of Service. Cost-wise, the increase in services will add to the overall expenses of doing business, but the mission of providing medical services to those in need will be better supported.

Patient Enrollment Report

The uses of the patient enrollment report is at two primary areas: the Central Appointment and the Clinical Reception Desks. The Central Appointment Desk personnel have used this information both in verifying and making appointments, and in answering questions of patients regarding when they are to

return. With the elimination of the patient information card, the patients are simply sent a reminder of when they should call to make their appointment. They must take the initiative to complete arrangements for their appointments by calling the Central Appointment Desk personally (or by a friend or family member). This simple requirement better insures the patient of input and personal consideration for their appointment time, and reduces the frequency of cancellations and no shows. Additionally, it has been found that the time required to make an appointment by the Central Appointment Desk has been reduced by more than one minute per appointment. This is accomplished by eliminating the need to transpose information onto the actual appointment schedule and appointment cards both. With this system the information is taken directly from the patient, put on the appointment schedule and conveyed back to the patient directly, while on the telephone. The patient assumes responsibility for recording or remembering when to be at the

clinic for the appointment; no further notification is made. If the patient forgets the appointment information, they call either the clinic or the appointment desk and have it checked on the tentative appointment schedule.

In addition to the aforementioned uses, the patient enrollment report also eliminates a considerable amount of confusion and duplication for the appointment system. In the past, if a patient returned prior to the original projected date of return, a new patient information card was compiled and filed in addition to the one previously made. As a consequence, a "blind appointment" was made when the patient didn't really need one. With the new system, if a patient returns early and a new proposed return date is set, this information is recorded on the patient enrollment report. If the appointment desk personnel see a duplicate entry for the patient, only the most current information is used, which is easily identified by the given data of last visit.

The clinical receptionist and other clinical personnel use the patient enrollment report as a ready means to locate the phone number of the patient in case they need to contact them. It was found that the patient's phone number with other identifying information (name and social security number) is all they really needed in their rolodex card system all along. Now, with the patient enrollment report, there is no need for the rolodex at all. Additionally, if the patient's address is needed it can be obtained from the patient's clinical records.

Altogether, the patient enrollment report, its many uses, and changes in the original appointment system have accounted for:

- a) eliminating the patient information card (54 seconds);
- b) changing of the patient appointment card to an appointment reminder card (batch mailed) (10 seconds);
- c) eliminating the need to transpose appointment information from the appointment sheet to an appointment card (10-15 seconds);

- d) eliminating the need for an appointment slip for the Outpatient Records Office (20 seconds);
- e) eliminating the need for maintaining a manual rolodex card file (44 seconds);
- f) better insuring patient input into making their appointments;
- g) reducing the number of cancellations and no shows for the clinic, and
- h) reducing the time to answer patient questions.

It can be concluded that this report and the new system procedures have saved more than thirty man hours between the Central Appointment Desk and the clinic. This time allows them to provide better and more service to their other clientele.

Monthly Clinical Morbidity Report

As previously mentioned, the monthly clinical morbidity report is a requirement of BUMED which had been accomplished manually prior to this time with questionable accuracy. Under the new system, computation of the report is done within minutes automatically by the Data Processing Service by

manipulation of the computer cards used for the month's appointments. Because of elimination of a page by page tally to find a daily total, then a day by day tally to find a monthly total, there is a time savings of as much or more than two hours for this function by the clinical staff. Additionally, the accuracy of the report is almost insured to be correct to the exact visit. This means the report going to BUMED is a better quality report.

Clinical Performance Report

The clinical performance report is a recap of the productivity of all the individual practitioners of the Internal Medicine Clinic. The report is designed to reveal not only quantity, but also include an element for quality. In this regard, the total number of patients seen by a patient equated to quantity, while the total amount of patient contact time equates to quality.

The intent of providing this information was to provide the Chief of Service objective information concerning the productivity of his physicians.

Interpretation of what the data meant was left to the Chief of Service; however, a national study on Internal Medicine Practice was provided as a basis for comparison.

The national study was done by the University of Southern California, Division of Research in Medical Education during 1976. As part of their study of 1821 physicians, of which 947 responded, they found the average productivity rate of an internist, after given consideration to the individual's practice arrangement (i.e., solo, partnership, group, institutional, etc.).¹

The rate most comparable to the Internal Medicine Clinic setting of this study were those established for group practice physicians. This rate reflected an average of sixty-three outpatient visits and thirty-one inpatient visits per internist for a one-week time period.² However, it should be pointed out that this was for a preassigned week for the physician being surveyed, which could have allowed for scheduling of patients beyond normal

scheduling practices. This statement is made because the results of the study done by the University of Southern California far exceed the findings of this survey.

Because of a great disparity in productivity levels between the aforementioned study and this one, it was decided to use the mean numbers and times of patient encounters in the Internal Medicine Clinic for their own physicians (this excludes physician's assistants) as a basis to compare themselves. The average number of patients seen by a physician in the Internal Medicine Clinic during this seven week period was 29. The average patient contact time was calculated to be 740 minutes.

The Chief of Service, in addition to the clinic productivity report, was provided a trend analysis over the same seven week period for each of his physicians (he now computes this himself). These trends were graphically displayed showing the individual physician's

productivity in comparison with the mean visits and patient contact time for the clinic. Additionally, it showed:

- a) the percent of patients told to return by the individual physician;
- b) the number of unscheduled patients seen by physician;
- c) the percent of total time spent seeing unscheduled patients, and
- d) a productivity index for each physician.

To compile the actual individual productivity indices some externalities had to be considered such as numbers of duties stood during the week and if the physician was available for the whole week. This information, along with the actual overall individual performance, is available in Appendix A.

The cost-benefit of having a report such as the physician productivity report depends entirely on the manager's use of the data developed. If the data signifies a problem and he is able to successfully address the problem early enough,

chances are that productivity of the individual will go up; thusly, the list has proven to be invaluable.

Aside from the use for the Chief of Service, the report also provides the individual practitioner direct timely feedback on his performance, which makes him aware of how he compares to his colleagues. The overall improvements in productivity shown may be long-range, but the trend lines overall show a gradual increase in individual productivity.

Daily Appointment Schedules

The computer printed daily appointment schedules have very simply eliminated the logging procedures for patients with advance appointments. This savings has allowed the clinical receptionist to process patients checking in faster, thereby reducing some patient waiting time and inconvenience. Other benefits of the preprinted schedule are that it is legible, printed in duplicate, and delivered to the clinic the afternoon prior to closing.

The original of the schedule is used by the receptionist for the historical log, and the copy is given to the practitioner. This makes the provider aware of what his schedule will actually be the next day.

Numerical List of Patients Having Appointments

This list of patients having appointments, numerically arranged in ascending order by social security number, has been discontinued. It was found that the individual computer cards arranged in the same order were all that was needed. The personnel of the Records Office receive these cards the day before the actual appointments and have the patients' records pulled and sent to the clinic before the close of business that day. Because these cards contain the same information (actually more) than the previously used appointment slips had, the use of the appointment slips was eliminated, saving approximately twenty seconds per visit. More time is saved also because the cards are already in file order; previously they

had to be manually put in order by the Records Office personnel. Finally, the card serves as a legible document locator that enhances control of the clinical records.

Footnotes

¹Robert C. Mendenhall, Project Director, University of Southern California, Division of Research in Medical Education, and et al. Internal Medicine Practice Study Report. (Princeton, N.J.: The Robert Wood Johnson Foundation, 1977), page 8.

²IBID., page 21.

CHAPTER IX
CONCLUSIONS/RECOMMENDATIONS

Conclusions

It is concluded from this research effort that the clinical information system tested within the Internal Medicine Clinic at the Naval Regional Medical Center, Orlando has significantly enhanced the efficiency of operations and management of that clinic.

Based upon this research effort, it is apparent that the tested system has refined appointment scheduling procedures, improved patient accessibility to the clinical services, and reduced and made efficient patient processing at the clinical level. Additionally, it has provided potential for rendering a higher quality of patient care, promoted better communications among the elements, and given the Clinical Chief of Service objective information on which to better manage his clinic. All of this was achieved at a total cost of less than one-half the salary of a new GS-3 clerk/typist.

It can be concluded that overall the clinical information system in this clinic has been a success, and the majority of the system can be applied to the other clinics of the Naval Regional Medical Center. However, it is also evident that each individual clinic is unique in itself and presents certain distinguishable characteristics and needs of its own. Therefore, if this system were to be applied to other clinics, it would have to be modified to satisfy the requirements of that clinic.

Recommendations

Despite the successful operation of this system, it was readily apparent that the Data Processing Service was tasked to the saturation point with other workload in addition to this program. The fact is the current data processing system is inadequate to handle further increases in services with the equipment they presently have. Unless new and better equipment or more personnel are brought into the Data Processing Service, further expansion of this project is not possible.

In view of the fact that a new computer system is budgeted for in 1982, it is recommended that the current clinical information system be limited to the present Internal Medicine Clinic until the Data Processing Service's capabilities are increased.

It is further recommended that a study be initiated to legitimize the productivity expectations of an Internal Medicine practitioner, so that an acceptable standard can be made available.

APPENDIX

A

Physician Productivity Summary

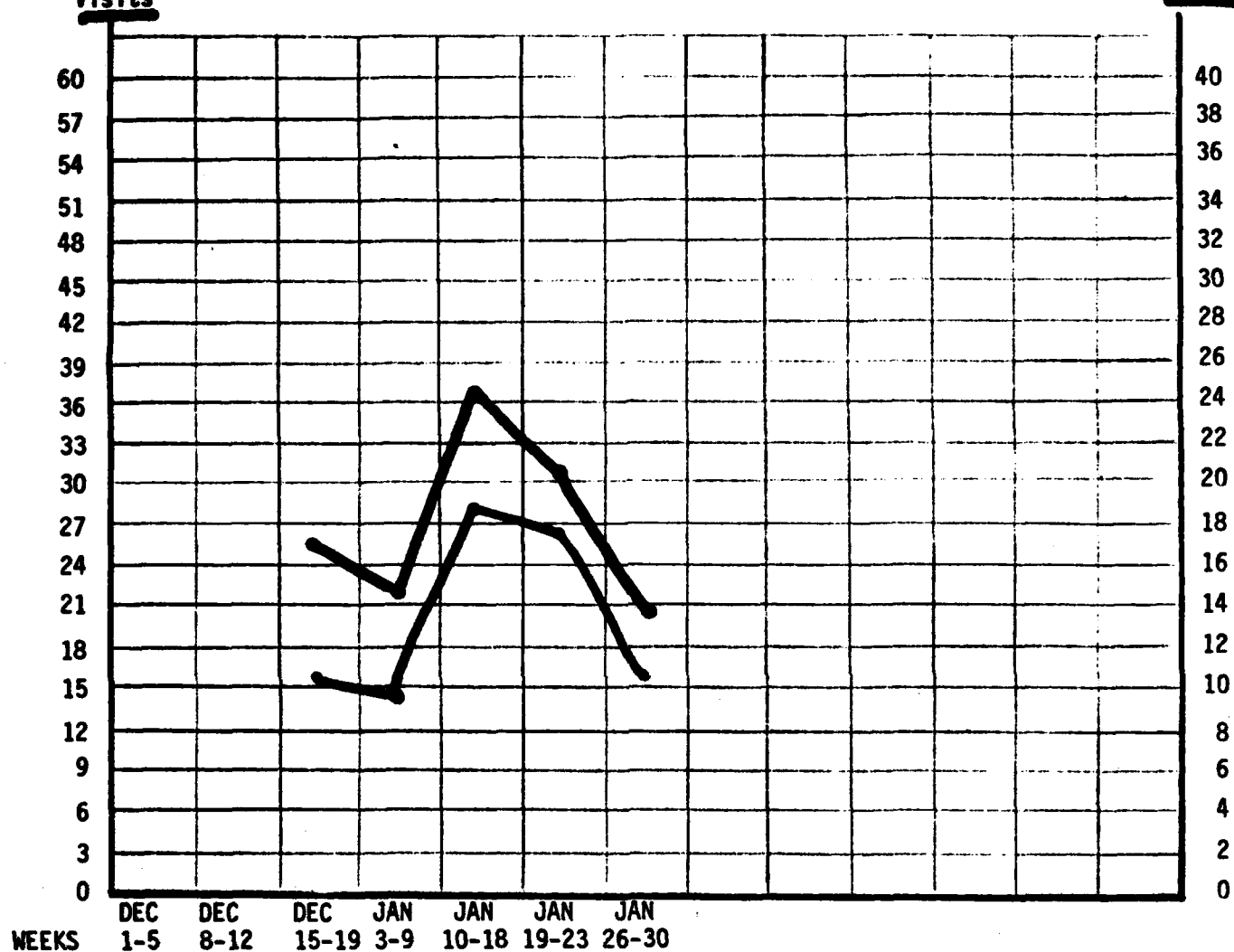
The charts provided in this appendix graphically display trends in individual Internal Medicine practitioners' performance. Page 81 provides a key to the notes provided on each chart. Productivity indices are not given for providers 007 and 008, (physician's assistants), because it was felt that the data base was not ample to compute a meaningful standard at this time.

001

74

Number of
Patient
Visits

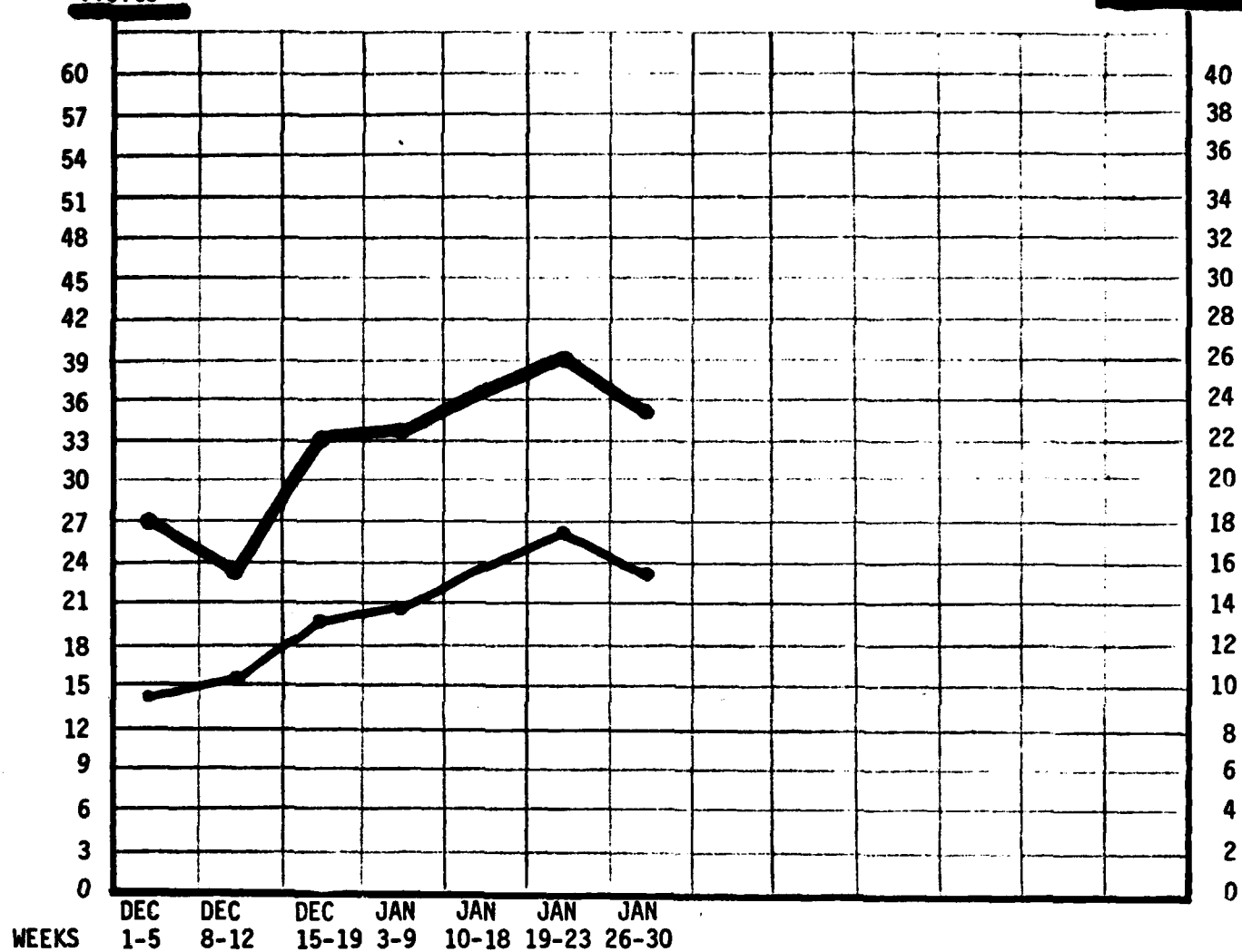
PHYSICIAN # 001

Patient
Contact
Time (Hours)

Variables														
Duty			19	5,9	14		27							
TAD	1-5	8-12												
Leave														

NOTES (See attached list for explanation)

1			46%	50%	27%	81%	60%							
2			13	10	17	13	11							
3			56%	53%	57%	45%	58%							
4				87%	143%	111%	83%							

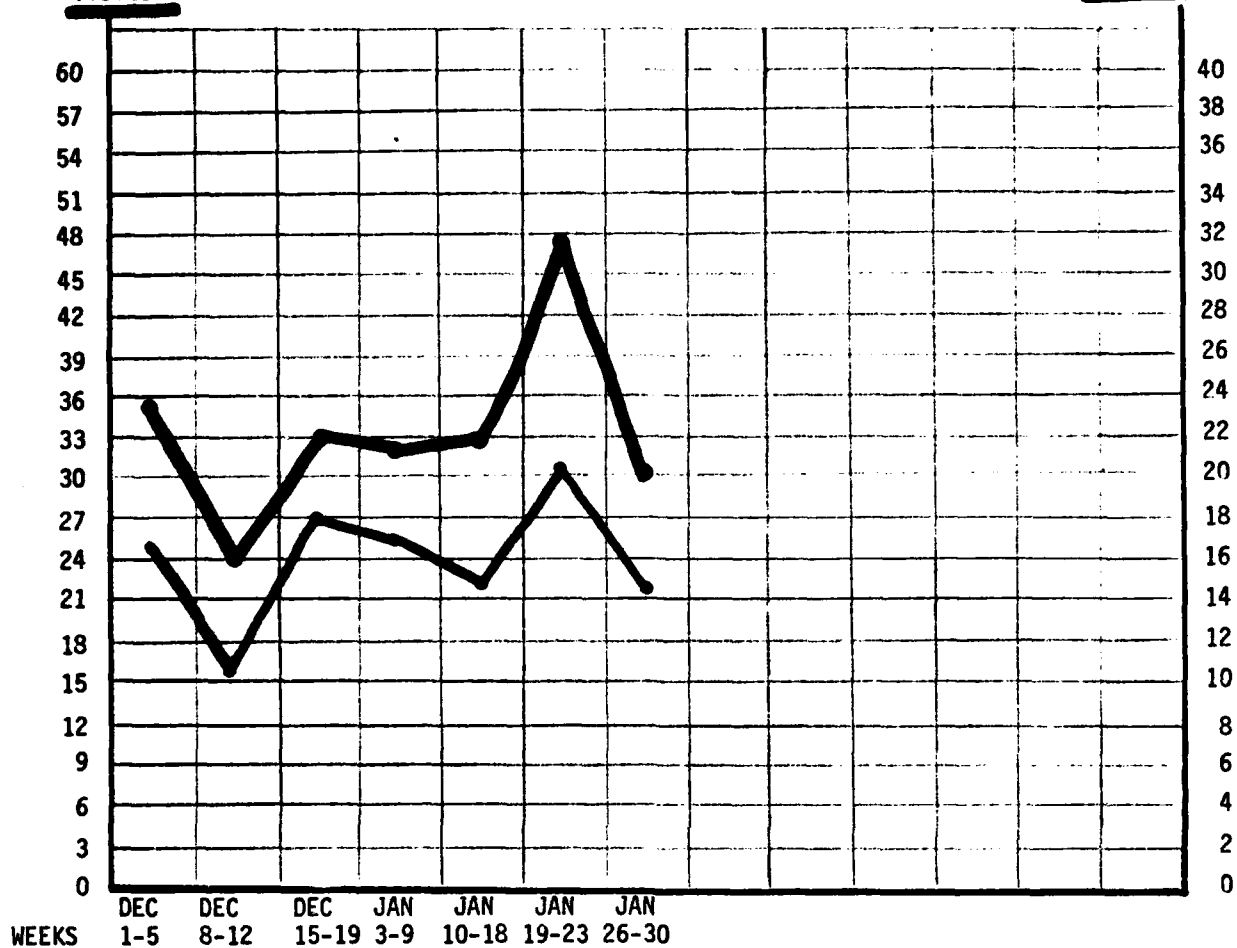
Patient
Contact
Time (Hours)[illegible]

NOTES (See attached list for explanation)

1	70%	57%	61%	50%	41%	61%
2	10	8	13	19	19	14
3	40%	51%	47%	62%	67%	53%
4	86%	82%	112%	116%	142%	127%

Number of
Patient
Visits

PHYSICIAN # 005

Patient
Contact
Time (Hours)

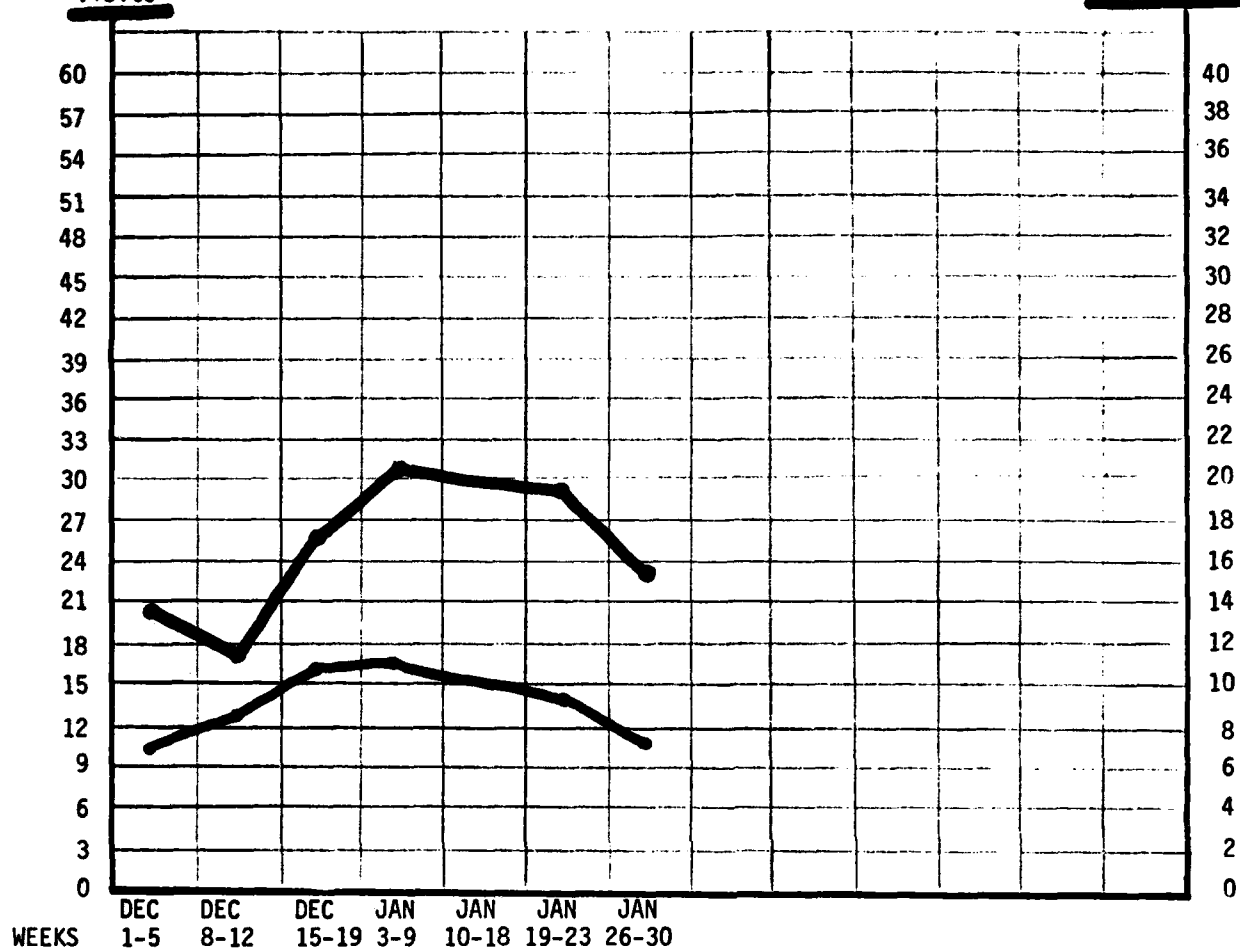
Variables										
Duty	3	9,12			12,16	21				
TAD										
Leave						29				

NOTES (See attached list for explanation)

1	66%	58%	70%	81%	45%	57%	73%			
2	10	7	8	8	15	15	12			
3	26%	24%	26%	24%	43%	19%	40%			
4	130%	92%	116%	110%	130%	166%	99%			

Patient
Contact
Time (Hours)

Number of Patient Visits

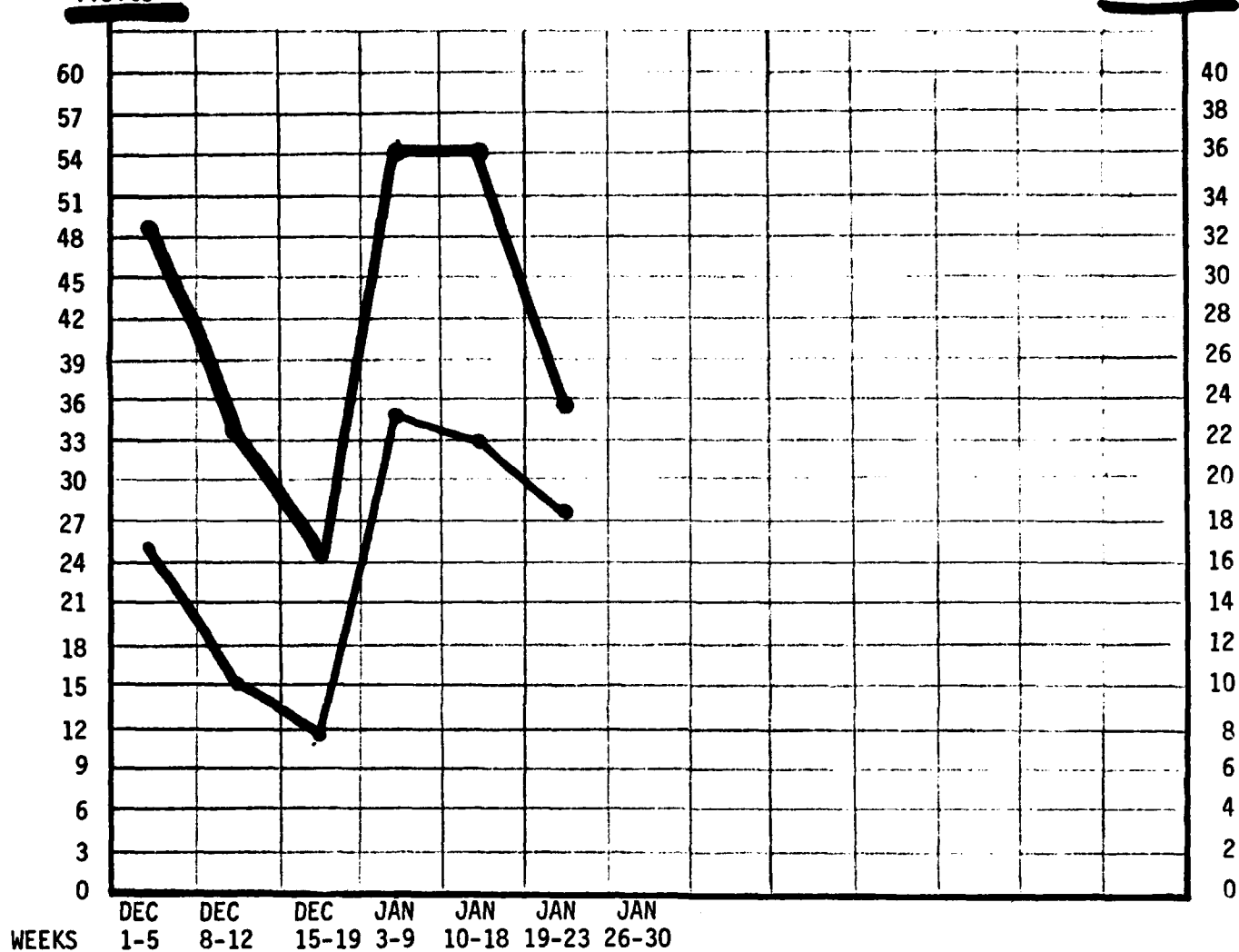
[illegible]

NOTES (See attached list for explanation)

1	95%	88%	88%	90%	90%	96%						
2	3	5	1	3	6	2						
3	16%	22%	2%	6%	20%	7%						
4	65%	65%	80%	100%	98%	71%						



PHYSICIAN # 007

Patient
Contact
Time (Hours)Number of
Patient
Visits

Variables

Duty

TAD

Leave

NOTES (See attached list for explanation)

1	82%	76%	80%	57%	83%	72%	77%
2	5	8	4	6	8	10	8
3	10%	26%	17%	12%	18%	14%	26%
4							

AD-A194 468

A CLINICAL INFORMATION SYSTEM AT THE NAVAL REGIONAL
MEDICAL CENTER ORLANDO, FLORIDA (U) ARMY HEALTH CARE
STUDIES AND CLINICAL INVESTIGATION ACTIVITY I.
A J SMITH 24 APR 81 HCSIA-5-88

2/2

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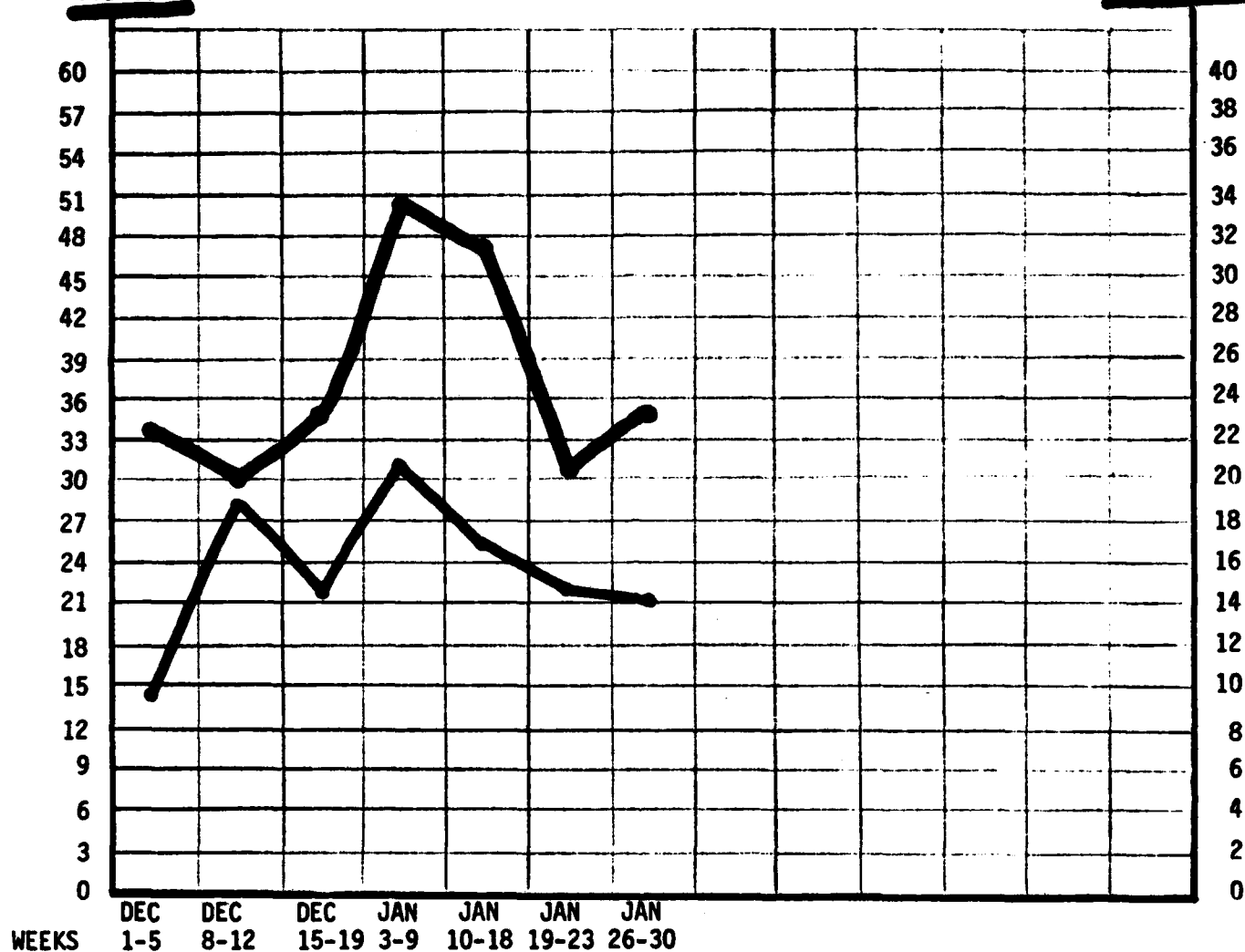
F/G 6/3

NL

END
DATE
FILMED
4/8



PHYSICIAN # 008

Number of
Patient
VisitsPatient
Contact
Time (Hours)

Variables

Duty

TAD

Leave

NOTES (See attached list for explanation)

1	94%	93%	88%	88%	83%	78%	77%
2	1	1	3	0	7	5	8
3	3%	5%	10%	0%	10%	13%	13%
4							

Key to Notes:

1. Percentage of total number of patients told to return.
2. Number of unscheduled patients seen.
3. Percentage of total time spent seeing unscheduled patients.
4. Productivity index for the indicated physician during the time specified.

Compute the productivity index by using the following formula:

$$\begin{aligned}
 \text{Productivity Index} = & \frac{\text{Actual \# of patients seen}}{\text{Standard for \# days worked}} \\
 & + \frac{\text{Actual minutes patient contact time}}{\text{Standard for minutes contact per week (given variables)}} \\
 & \times 50
 \end{aligned}$$

Standards for the above formula were computed from data collected over 4 seven-week periods for all the Internal Medicine physicians except one who was absent on maternity leave. Consideration was given for the number of days a physician had duty because no routine appointments were scheduled during this time.

WEEKLY PERFORMANCE STANDARDS

DUTY STATUS	AVERAGE # OF PATIENTS SEEN	AVERAGE # OF MINUTES PATIENT CONTACT TIME
One Duty Day	29	716
Two Duty Days	27	650
No Duty Days	30	887
Overall	29	740

APPENDIX

B

The Patient Encounter Cycle (Preexisting System)

APPENDIX B

The Patient Encounter Cycle (Preexisting System):

Steps

1. Consult to Chief of Service.
 2. Chief of Service accepts patient (if not, patient is advised to seek care elsewhere).
 3. An appointment is made.
 4. Patient arrives for appointment.
 - a. Patient Information Card completed.
 - b. Log the patient in.
 - c. Fill out patient medical check list (for tests).
 - d. Forms attached to chart.
 5. Patient/Physician Encounter
 - a. Patient receives treatment; no return indicated. No further action necessary.
 - b. Patient receives treatment; return visit is indicated.
- Proceed to Step 6.
6. Patient information card completed with month of return indicated.

7. Patient information card collected by clinic staff and taken to the Central Appointment Desk.

8. Central Appointment Desk personnel file cards according to month of return.

9. Approximately one month before visit due, patient information card is pulled from file.

10. The patient's information is transposed to the appointment sheet and the appointment information is put on the card.

11. An appointment postcard is completed and mailed to the patient with the appointment information.

12. An appointment slip is completed and sent to the Outpatient Medical Records Office.

a. Patient's medical record is located.

b. Patient's medical record is sent to the clinic.

13. Patient information card refiled according to month seen.

14. Patient returns to clinic on scheduled appointment day; cycle begins again from step 4.

If the patient did not return as scheduled, the cycle was reentered at step 8.

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APPENDIX

C

Patient Enrollment Report

This appendix is an excerpt from the complete Patient Enrollment Report. The names provided are actual patients; therefore, access and further copies of this list should be protected from unauthorized disclosure.

APPENDIX

G

**Procedure Guide for Making
Internal Medicine Appointments**

APPENDIX G

PROCEDURE GUIDE FOR MAKING INTERNAL MEDICINE APPOINTMENTS

All appointments made in either the Internal Medicine Clinic or Chronic Care Clinic for November 1980 hence will be made via the following procedures.

1. Appointments will be made by either the Central Appointment Desk (#5665) or the Internal Medicine Clinic staff. For appointments scheduled more than 48 working hours in advance, the Daily Medical Appointment schedule shall be completed by Central Appointment Desk personnel.
2. Cancellations of appointments if made 48 hours (two workdays) prior to the actual appointment shall be accomplished by completing a 6ND NRM25-6320/30 (appointment sheet) and writing in large letters across the patient data block the word "cancelled."
3. After the aforementioned input documents are completed, they should be placed in a designated collection point, collected daily by clinic personnel, reviewed for correctness and legibility, and then delivered to the Data Processing Service for continued processing.
4. Data processing personnel will keypunch the information into computer cards, compute and provide the following reports and cards to the indicated areas.

a. A printed list and computer cards in numerical sequence of patients having appointments for the indicated clinic will be delivered to the OPD records supervisors by 0900 on the day prior to the day of the scheduled appointments.

b. A printed list and grouping of computer cards by clinic and physicians indicating the name and time of the actual patient appointments will be placed in an envelope and delivered to the designated clinic via the OPD records supervisor. This envelope should be delivered with the list provided in paragraph 4a above on the day prior to the actual date of the scheduled appointments.

5. OPD records personnel will pull the listed records, using the computer card as a records locator, and insure that the records and envelope containing the report indicated in paragraph 4b is delivered to the appropriate clinic by 1500 the day preceding the appointment date. (The clinic may be required to pick up these records.)

6. Clinic Receptionist shall:

a. Verify the information printed across the top of each card.

b. For walk-in, calendar, emergency, and any other appointments for patients to be seen in less than 48 hours after 1 November 1980, a specially preprinted computer card shall be completed as follows:

APPT	Name	Phone	Pt. Status	Mo Day Yr	Time
					Phy Code
APPOINTMENT:		ACTUAL TIME SPENT WITH PATIENT _____			
1. ADVANCE		For Active Duty Navy & Marine Corps Patients:			
2. WALK-IN		1. New Case			
3. TELEPHONE		2. Return Visit Dx. _____			
4. Calendar		Reschedule for: _____ A B C			
PATIENT TYPE:					
1. OUTPATIENT					
2. INPATIENT					

Across the top:

- (1) Social Security Number (Last four digits only)
- (2) Name: Last, Initials
- (3) Patient status, i.e., DW/N/Ret

DW - Wife	N - Navy	Sponsor Category
DS - Son	A - Army	Act - Active
DD - Daughter	MC - Marine Corps	Ret - Retired
DM - Mother	CG - Coast Guard	Dec - Deceased
DF - Father	PHS - Public Health Service	
	FOR - Foreign	

- (4) Month, Day of appointment and time.
- (5) Identify the physician the appointment is with.
- (6) MIN - Minutes: specify the amount of time the patient is scheduled to be with the physician.
- (7) Appointment - Circle the appropriate entry.
 - (a) Advance - Circle this if the patient is arriving for a scheduled appointment.
 - (b) Walk-in - if this his/her arrival, if patient did not have a scheduled appointment before.
 - (c) Telephone results - Circle if the patient calls in and the physician makes a medical record entry. In this situation the entire master card must be completed. The following form, 6ND NRMC 6300/6 may be used in lieu of the actual service record entry. This form will eventually be placed in the appropriate medical record.

NAME	CLINIC	
SSN	STATUS	DATE/TIME
TELEPHONE CONSULTATION		

(8) Patient Type - Check the appropriate entry.

(a) Inpatient Visits. Inpatient visits shall be recorded for patients occupying beds, subsisting out, or on leave, who are treated in a clinic for a condition related to a primary cause for admission.

(b) Outpatients. There are two categories of outpatients. Patients who are not registered inpatients at the reporting facility at the time of treatment visit are considered to be outpatients. In addition, visits of inpatients who are treated at a service/clinic for a condition which is not related to the reason for admission shall be counted as outpatient visits. For example: patient comes from home to gynecology clinic - one outpatient visit, orthopedic inpatient visits optometry clinic - one outpatient visit. The classification of a visit shall not be dependent upon the professional level of the person providing the service (includes physicians, nurses, physician's assistants, medical specialists, medical technicians and corpsmen).

(9) Actual time spent with patient: Make out entry in minutes if the time spent with the patient was different from the time allotted for the appointment, i.e., 01-99 minutes, for cancellations or DNKA (Did Not Keep Appointment).

(10) For Active Duty Navy & Marine Corps members:
circle appropriate entry.

(a) New case

(b) Return visit

Diagnosis: (Enter the patient's diagnosed
condition for which he was seen.)

NOTE: This is only required for active duty Navy and
Marine Corps personnel. The following general
chart and indicated numbers should be used in
lieu of actual diagnosis.

ITEM		ITEM		ITEM	
1	Infective and Parasitic Diseases	23	Respiratory System Diseases	45	Accidents, Poisonings, and Violence
2	Acute Gastroent, Diarrhea, Dysentery	24	Acute Respiratory Diseases, Incl URI	46	Battle Casualties (21)
3	Gonorrhea	25	Influenza Syndrome	47	Adverse Effects of Noise
4	Syphilis	26	Occupational Inhalation Diseases	48	Adverse Effects of Heat, Local
5	Genital Herpes Virus	27	All Other Respiratory Diseases	49	Adverse Effects of Heat, Systemic
6	Nongonococcal Urethritis			50	Adverse Effects of Cold
7	Other Sexually Transmitted Diseases	28	Digestive System Diseases	51	Motion Sickness
8	External Parasites			52	Motor Vehicle Accidents
9	Fungal Diseases, Athlete's Foot	29	Genitourinary System Diseases	53	Occupational Injuries
10	All Other Infective & Parasitic Diseases			54	Occupational Poisoning
		30	Comp of Pregnancy, Childbirth, Puerperium	55	Nonoccupational Injuries
11	Neoplasms			56	Adverse Effects of Medication
		31	Skin and Subcutaneous Diseases	57	All Other Accidents, Poison, & Viol
12	Endocrine, Nutr, & Metabolic Diseases	32	Cellulitis, Pyoderma, and Abscess		
		33	Occupational Dermatitis	58	Family Planning, Contraception
13	Blood Diseases	34	Heat Rash	58F	Female
		35	Nonoccupational Allergic Dermatitis	58M	Male
14	Mental Disorders	36	Moles, Warts, and Cysts		
15	Alcoholism	37	All Other Skin Diseases	59	Supplementary Classifications
16	Marijuana				
17	Narcotic Drugs	38	Musculoskeletal System Diseases	60	TUBERCULIN TESTING
18	Non-narcotic Drugs			61	Skin Tests Read
19	Combination	39	Congenital Anomalies	62	Skin Tests Reactive
20	All Other Mental & Behavioral Diseases			63	Skin Tests Converters
		40	Signs, Symptoms, & Ill-defined Conditions	64	Skin Tests Nonreactive
21	Nervous System & Sense Organ Diseases	41	General Malaise, Fatigue	65	Screening X-rays
		42	Headache	66	Screening X-rays Abnormal
22	Circulatory System Diseases	43	Fever of Undetermined Origin	67	Patients Placed on MTH
		44	All Other Signs and Symptoms	68	Reactions to MTH

c. Insure that the computer card is received by the physician/practitioner at the time of the appointment. Particular attention must be directed to paragraph 1b(7) to insure proper handling of patients having appointments made within 48 hours of the appointment time.

d. Cooperate with the other clinic personnel to insure that no patient is seen without having a completed computer card.

7. Clinic Physicians/Practitioners shall:

a. Verify that the information printed on the top of the computer card is relative to the patient being seen, and that his code is printed correctly. Particular attention should be paid to the number above the entry min. This is the scheduled time allotted to be with the patient.

b. Complete the computer card body information in accordance with section 1b(9) & (10). Completing this information will directly give the physician credit for time spent with the patients and assist in Medical Department planning.

c. Place the card at the appropriate collection point to insure all cards are collected for further processing at the end of each day.

8. Clinic Nurse shall:

a. Provide supervision to insure that the aforementioned procedures are followed and that the information provided is accurate.

b. Insure that the appointment forms and computer cards are delivered to data processing by 1630 daily.

c. Report any problems that occur in regard to the system to the Chief of Service and to chiefs of other departments concerned. (OPD and Data Processing).

9. Chief of Service shall:

a. Coordinate this program with the services involved.

b. Be responsible for resolving problems occurring with this project within his clinic.

c. Inform the Chief of Data Processing of the frequency and types of reports needed.

d. Assign code number to newly reporting physicians/practitioners during the pilot test project.

10. The Chief of Data Processing shall:

a. Provide the clinical chief of service and OPD records supervisor all reports indicated in paragraph 3 of this instruction.

b. Provide the monthly morbidity report, from this information submitted to the clinical chief of service and Patient Affairs Officer.

- c. Provide to the Clinical Chief of Service management reports as agreed upon.
- d. Cooperate with the Chiefs of Services in resolving problems and improving the program as indicated.

APPENDIX

H

**Procedures for Cancellation of
Internal Medicine Appointments**

NRMC25-39
1 December 1980

MEMORANDUM

From: LT A. J. Smith, MSC, USN
To: Internal Medicine Clinic and Central Appointment Desk
Personnel

Subj: Cancellation of appointments for Internal Medicine Clinic

1. After talking with persons involved with the Internal Medicine appointment system, both at the clinic and central appointment desk, I have detected differences in the interpretation of how appointments are to be cancelled under the current system. This difference stems from an apparent question of who should accomplish the task and when.

2. To resolve this question the following procedures should be followed (as previously directed):

a. The Central Appointment Desk personnel shall take action on any cancellation of an internal medicine appointment that occurs prior to 1600 on the day the computer cards are sent to Data Processing Service to compile the clinic and OPD Records Office Daily Appointment List. This is approximately 40 hours prior to actual time the Internal Medicine Clinic opens to treat the listed patients.

b. The Internal Medicine Clinic personnel shall take action to accommodate any appointment cancellations made the day of, or the day before, the actual appointment time. This is done simply by noting the cancellation on the daily appointment sheet. If a new appointment is to be made for the patient, it should be done by making a calendar appointment or by completing a new 6ND NRMC25-6320/32 (the 3x5 white card with patient information) and submitting it to the central appointment desk for future scheduling.

3. Data compiled for the month of November show that 55 appointments were cancelled within 48 hours of the scheduled appointment time. Out of the 55 cancellations, 14 did not require new appointments. This leaves 41 patients that needed rescheduling, which means an average of 2 per workday. Considering the fact that at least 8 of these were cancelled intentionally by the clinic due to physician nonavailability, the daily average of cancellations is below 2 patients per day. In view of the relatively insignificant number involved, I feel that the secretary of the clinic can handle the task with little inconvenience. However, Central Appointment Desk personnel should insure that they refer to the clinic only those calls concerning cancellation of appointments on the day of, or the day preceding, the actual scheduled appointment.

NRMC25-39
1 December 1980

Subj: Cancellation of appointments for Internal Medicine Clinic

4. Your positive efforts and cooperation will insure that the appointment system will work for the benefit of the patient and all others involved. Thank you for your continued support.

A. J. Smith
A. J. SMITH
LT MSC USN

ARE
LME
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